PATENT APPLICATION
Attorney Docket: 10030906-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS

Applicant:	Pleasant
Serial No.:	10/783,645
Filed:	2/20/2004
For:	Method of Determining Measurement Uncertainties Using Circuit Simulation
Group Art Unit:	2123
Examiner:	Pierre Louis, Andre

BRIEF FOR APPELLANT

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from the decision of the Primary Examiner dated 09/11/2007, finally rejecting Claims 1-16 in the above-identified patent application.

I. REAL PARTY IN INTEREST

The real party in interest is Agilent Technologies having an address as listed below.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to appellant, the appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

III. STATUS OF THE CLAIMS

Claims 1-16 are currently pending in the above-identified patent application. In the Office Action dated 09/11/2007, the Examiner rejected Claims 1-16 and indicated that the Action was final. Claims 1-16 are the subject of this appeal.

IV. STATUS OF AMENDMENTS

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V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention is directed to a method for determining a measurement uncertainty of a test system, using a test model having a plurality of uncertainty terms entered into a simulator. The test system model is run on the simulator with some of the uncertainty terms randomly varied within probability distributions to produce a statistically significant number of results of the parameter whose uncertainty is to be evaluated.

With respect to Claim 1, refer first to Figure 4 and the discussion thereof beginning on page 8 paragraph [0033] of the present application. The embodiment of the current invention shown in Figure 4 includes the steps of the method required by claim 1, beginning with a first step (402) of developing a model of the test system including a plurality of uncertainty terms. The next step (406) required by claim 1 enters the test system model into a simulator. Then, in step 408, a number of iterations are run on the simulator, varying some of the uncertainty terms, to obtain a statistically significant number of results for the measurement parameter of interest. The last step (410) of the method specified by claim 1 is that of evaluating the results of the simulation runs to determine a measurement uncertainty of the parameter of interest.

Claims 2-4 place limitations on the engine used by the simulator to produce the results. Claim 2 requires a harmonic balance simulation engine, claim 3 requires a time-domain simulation engine, and claim 4 requires a linear S-parameter simulation engine.

Claims 5 and 6 relate to the plurality of uncertainty terms used to develop the model of the test system, with claim 5 requiring that the plurality of uncertainty terms includes a noise term, and claim 6 requiring that the plurality of uncertainty terms includes a test instrument uncertainty term for a test instrument in the test system. Claim 7 limits the uncertainty term to being either a temperature drift uncertainty term, an aging drift uncertainty term, an accuracy uncertainty term, or a repeatability uncertainty term.

Claims 8-12 relate to the test system model, with claim 8 requiring the test system model to include a device under test and also, along with claims 9 and 10, putting limitations on the step of running the iterations of the simulation regarding signal frequencies. Claim 11 requires the test system model to include a test instrument as a device under test, and claim 12 requires the inclusion of a test fixture comprising a plurality of switches and a plurality of cables.

Claims 13 and 14 specify details for the step 408 that runs iterations of the simulation.

Claim 15 adds a step of developing a computer-readable library to the method of claim 1, which affects the existing step 406 for entering the model into the simulator.

Claim 16 specifies details of existing step 404 for developing the test system model.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. **Rejection of Claims 1-4 and 6-16 under U.S.C. 103(a) as being unpatentable over Jamneala (US 6,804,807) in view of Piratelli-Filho (Uncertainty Evaluation in Small angle calibration Using ISO GUM Approach and Monte Carlo Method, June 2003).**

B. **Rejection of Claim 5 under U.S.C. 103(a) as being unpatentable over Jamneala, in view of Piratelli-Filho and further in view of Helisto (Measurement Uncertainty in the 1/f noise region: Zener Voltage Standards IEEE 2000).**

VII. ARGUMENT

A. Examiner's Burden under 35 U.S.C. 103

To sustain a rejection under 35 U.S.C. 103, the Examiner must show that the combined references teach each of the elements of the claim or that there is some motivation in the art for altering one of the teachings to arrive at the combined set of teachings. "The mere fact that a reference could be modified to produce the patented invention would not make the modification obvious unless it is suggested by the prior art." (*Libbey-Owens-Ford v. BOC Group*, 4 USPQ 2d 1097, 1103). In addition, the Examiner must show that there is

some motivation in the art that would cause someone of ordinary skill to combine the references, and that in making the combination, there was a reasonable expectation of success. Where the claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under section 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *In re Vaeck*, 20 USPQ2d 1438, 1442(CAFC 1991).

B. Rejection of Claims 1-4 and 6-16 as being unpatentable over Jamneala in view of Piratelli-Filho

1. Rejection of Claim 1 and the claims dependent therefrom

In rejecting claim 1, the Examiner states that Jamneala teaches the limitations except for any explicit mention of measurement uncertainty. The Examiner looks to Piratelli-Filho for the missing terminology/teaching, maintaining that it would be obvious to apply the latter teachings to obtain "expanded uncertainly results …….to simplify analysis (abstract)" in the system of Jamneala.

However, the Examiner does not explain how one would apply the system of Piratelli-Filho in the system of Jamneala. Applicant submits that there is no expectation of success in making such an application absent additional teachings.

Claim 1 requires a model with a plurality of **measurement uncertainties that are characterized by known probability distributions,** since the remainder of the claim requires that values for these uncertainties be chosen randomly with respect to such distributions. There is no such uncertainty in any of the models taught in Jamneala. Jamneala teaches a model in which the values of the inductances in a model of a probe are determined by varying the inductances in the model until the model generates results that agree with the results obtained with a known probe. There is no teaching of a probability distribution describing the statistical variability of the determined inductance. Without

knowing the uncertainty in the determined inductance, one cannot determine the uncertainty in the measurements made with the probe when applied to a device under test that arises from the uncertainty in the determined inductance.

The method of Piratelli-Filho also requires that **the uncertainty terms be described by known probability distributions**. Absent such distributions, there is no way to choose parameters for the Monte Carlo simulation technique taught in Piratelli-Filho. As noted above, the "uncertainty terms" that the Examiner identifies in Jamneala are not described by such probability distributions. They are simply the unknown values of the corrections for self inductance and mutual inductance to be applied to the model of the GSG probe to take into account a **fixed imperfection** in the probe. The method of Jamneala determines the values of the self inductance and mutual inductance and hence eliminates the errors arising from the imperfection in the probe.

Since the data needed to apply the teachings of Piratelli-Filho to the teaching of Jamneala is not present, Applicant submits that there is no expectation of success in making the combination of the two teachings.

In making the final rejection of this claim, the Examiner responds to Applicant's arguments by repeating that Jamneala teaches uncertainty terms and that Piratelli-Filho teaches a method for determining measurement uncertainties using simulation. The mere fact that all of the elements of a claim are known to the art is not sufficient to sustain a rejection under 35 U.S.C. 103. Identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. The mere fact that two or more references can be combined does not make the combination obvious unless the art also contains something to suggest the desirability of the combination (*In re Imperato*, 179 USPQ 730, 732; Interconnect Planning Corp. v. Feil, 227 USPQ 543, 551).

Accordingly, Applicant submits that the Examiner has failed to make a *prima facie* case for obviousness with respect to Claim 1 and the Claims dependent therefrom.

2. Rejection of Claims 2-4

Claims 2, 3, and 4 specify one type of engine each, as being used by the simulator to produce the results. The Examiner points to one passage in Jamneala (col. 6, lines 7-17) and one in Piratelli-Filho (section 2.2-3) for all of these additional teachings. Applicant submits that the cited passage in Jamneala merely refers to the use of an ADS simulator for generating a simulated model of a probe of the type taught in Jamneala being used with an exemplary circuit shown in Figure 2A of Jamneala, while the cited passage in Piratelli-Filho is a discussion of Monte Carlo simulation that does not mention any of the three types of engine of interest.

Applicant submits that while an ADS includes a harmonic balance simulation engine, and may also include time-domain or linear S-parameter simulation engines, the issue is not whether an ADS simulator includes harmonic balance, time-domain or linear S-parameter simulation engines, but whether Jamneala (or Piratelli-Filho) teaches the use of each of those engines in carrying out the method. Applicant submits that the Examiner has not pointed to any such teaching in Jamneala (or Piratelli-Filho) that any one of the three types of simulation engine is utilized in the simulations.

It should also be noted that Piratelli-Filho is directed to a method for determining measurement uncertainties in a mechanical system, and hence, any electronic simulation engine would be of limited, if any, relevance.

In making the final rejection, the Examiner responds to Applicant's arguments by encouraging Applicant to "further review the references cited not used for further information on the ADS simulator". Applicant must repeat that the issue is not the capability of the ADS simulator but whether the three specific simulation methods specified by claims 2, 3, and 4, are either taught by the prior art or obvious in view of the prior art. The Examiner has not pointed to any support for either of these alternatives.

Hence, Applicant submits that there are additional grounds for allowing Claims 2, 3, and 4.

3. Rejection of Claim 8

Claim 8 concerns the frequency at which either the DUT is probed and/or the results of the probing are analyzed. In particular, Claim 8 requires that the DUT is probed at a first frequency but the results are measured at a second frequency. The Examiner points to a series of passages in Jamneala and Piratelli-Filho (Jamneala Fig. 1B-4, col. 1, lines 60-64 and col. 6, line 41 to col. 8, lines 23; also Piratelli-Filho pg. 1-4) for the relevant teachings. Applicant submits that the cited figures and passages in Jamneala at best show that measurement simulations may be made over a range of frequencies. The Examiner has not pointed to any specific teachings in either of the cited prior art references that disclose probing the DUT at a first frequency and measuring the results at a second frequency. Moreover, as noted above, Piratelli-Filho is directed to mechanical systems in which electrical measurements at specific frequencies would have little if any relevance. Hence, Applicant submits that there are additional grounds for allowing Claim 8 and the Claims dependent therefrom.

4. Rejection of Claim 9

Claim 9 depends from Claim 8 and requires that the second frequency is a harmonic of the first frequency. The Examiner has not pointed to any such teaching in the cited art. Hence, there are additional grounds for allowing Claim 9.

5. Rejection of Claim 10

Claim 10 depends from Claim 8 and requires that the second frequency is a mixed product of the first frequency and a third frequency. Once again, the Examiner has not pointed to any such teaching in the cited art. Accordingly, there are additional grounds for allowing Claim 10.

6. Rejection of Claim 12

Claim 12 requires that the test system model includes a test fixture comprising a plurality of switches and a plurality of cables. The Examiner points to Jamneala, Fig. 1, col. 1, lines 60-64, col. 3, line 50 to col. 4, line 6; Piratelli-Filho pg. 1- 4 for the additional teaching. Applicant submits that there is no teaching in the cited Figures and passages in Jamneala of any switches or cables being included in the test system model. Applicant submits that the

Examiner has not pointed to any specific teachings within the 4 pages of the Piratelli-Filho reference regarding this limitation. In fact, the teachings of Piratelli-Filho are directed to measurements of a mechanical system that lacks both switches and cables.

In making the final rejection, the Examiner points to Jamneala (col.3 line 29-col.4 line 48) as teaching the plurality of switches and cables. First, Applicant submits that there is no mention of switches in the cited passages. Second, Applicant submits that the only mention of cables concerns the use of test cables in conventional calibration schemes (col.3 lines 35-37) and that Jamneala does not teach that even one cable is included in the test system model.

Hence, Applicant submits that there are additional grounds for allowing Claim 12.

7. Rejection of Claim 13

Claim 13 requires that the step of running occurs at a first operating condition and that the method also includes running a sufficient number of iterations of the test system model on the simulator at a second operating condition while randomly varying each of the first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of second results of the selected parameter, and evaluating the second results to determine a second measurement uncertainty of the selected parameter.

In rejecting claims 13 and 14, the Examiner points to Jamneala (Fig. 2B-5, col. 6, line 41 - col. 8, lines 23) and Piratelli-Filho (pg. 1- 4) as providing the additional teachings regarding the simulation steps. Applicant submits that **there are no uncertainty terms** in the system taught by Jamneala, that **no terms are randomly varied** in the system taught by Jamneala, and that **no measurement uncertainties are determined by evaluation of a set of "second results"**. With respect to the Examiner's citation of Piratelli-Filho, Applicant submits that it is the burden of the Examiner to point to specific teachings rather than to all four pages of the paper. The Examiner has not pointed to any specific passages within Piratelli-Filho that provide the missing teaching. Furthermore, Applicant can find no such teaching in the reference.

Moreover, regarding a further requirement of claim 13, Applicant submits that Jamneala does a single set of simulations at one set of conditions to determine the uncertainties taught therein. There is no need to run the simulations at a second operating condition, since the uncertainty to which Jamneala is directed can be removed with a simulation at one operating condition. Hence, there are additional grounds for allowing Claims 13.

8. Rejection of Claim 14

Claim 14 requires that the step of running includes running the simulation on a first simulation engine and then running the simulation on a second simulation engine. The Examiner has not pointed to any teachings in the reference of such a method. Hence, there are additional grounds for allowing Claim 14.

9. Rejection of Claim 15

Regarding Claim 15, the Examiner points to col. 8, lines 35-45 of Jamneala as teaching the additional requirement of a step of developing a computer-readable library of test system components with uncertainty terms, and wherein the step of entering the test system model into the simulator includes loading uncertainty terms associated with the test system components from the computer-readable library. Applicant submits that there is no teaching in the cited passage regarding the existence, let alone the loading of any uncertainty terms associated with the GSG probe. Hence, Applicant submits that there are additional grounds for allowing Claim 15.

10. Rejection of Claim 16

With respect to Claim 16, the Examiner points to Jamneala Fig. 5, col. 8, lines 12-23; Piratelli-Filho pg. 1- 4 as providing the additional teaching of the step of developing the test system model including automatically generating system specifications. Applicant submits that the cited figure and passage in Jamneala refer to the comparison of measurements and simulations but **do not disclose the automatic generation of system specifications**. With respect to the Examiner's citation of Piratelli-Filho, Applicant submits that it is the burden of

the Examiner to point to specific teachings rather than to all four pages of the paper. The Examiner has not pointed to any specific passages within Piratelli-Filho that provide the missing teaching.

In making the final rejection, the Examiner cites another passage in Jamneala (col.6 line 41-col.7 line 38) as providing the missing teachings. Applicant submits that this passage discusses simulated transmission and reflection characteristics but is silent as to any automatic generation of system specifications.

Hence, Applicant submits that there are additional grounds for allowing Claim 16.

C. Rejection of Claim 5 as being unpatentable over Jamneala in view of Piratelli-Filho and further in view of Helisto.

In making this rejection, the Examiner admits that Jamneala in view of Piratelli-Filho does not teach that the plurality of uncertainty terms includes a noise term, as required by Claim 5. The Examiner looks to Helisto for the missing teachings. The Examiner maintains that it would have been obvious to combine the uncertainty measurement method of Helisto with the method of Jamneala and the uncertainty evaluation method of Piratelli-Filho "because Helisto teaches a development that enables the measurements down to the fundamental noise limit of metrological devices (pg 402)."

First, as noted above with respect to Claim 1, from which Claim 5 depends, Applicant submits that Jamneala in view of Piratelli-Filho does not teach the limitations of the base claim, and there is no reasonable expectation of success in applying the method taught in Piratelli-Filho to the teachings of Jamneala. Helisto does not provide the missing motivation or teachings.

Second, Applicant submits that the motivation proposed by the Examiner for modifying the method taught by Jamneala according to the teachings of Helisto to satisfy the additional limitations of Claim 5 is flawed in two respects.

First, Applicant disagrees with the Examiner's reading of Helisto as teaching a development that enables measurements down to the fundamental noise limit of metrological devices. Applicant submits that while Helisto states (page 102, first line of Conclusions) that "present day instrumentation" enables such measurements, Helisto is silent as to how that is achieved, and is concerned instead with characterizing what that noise limit is in various frequency ranges. Hence, Applicant submits that applying the teachings of Helisto to Jamneala would not provide the benefit suggested by the Examiner of enabling measurements down to the fundamental noise limit.

Second, as noted above with respect to Claim 1, Applicant submits that there are no measurement uncertainties in the system of interest to Jamneala. There would be a measurement error due to a fixed imperfection, but that error is avoided by using the iterative simulation taught by Jamneala to converge on best-fit values of self inductance and mutual inductance to put into the model. Helisto is simply concerned with the study and characterization of 1/f noise. The Examiner has not pointed to any suggestion that there is any source of 1/f noise in the test system of interest to Jamneala. Hence, Applicant submits that there would be no motivation to use any of the teachings of Helisto regarding 1/f noise in the system taught by Jamneala.

In making the final rejection, the Examiner responds to Applicant's arguments by stating that Helisto measures "noise uncertainty in a noise region of a Zener voltage at high frequency". The Examiner has not pointed to any teaching in Jamneala regarding a Zener voltage. Hence, Applicant maintains that applying Helisto to the system of Jamneala would not be obvious.

Accordingly, Applicant submits that the Examiner has failed to make a *prima facie* case for obviousness with respect to Claim 5.

VIII. CONCLUSION

Appellants respectfully submit that for the reasons of fact and law argued herein, the decision of the Examiner in finally rejecting Claims 1-16 should be reversed.

Respectfully Submitted,

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APPENDIX

THE CLAIMS ON APPEAL:

1. A method of determining a measurement uncertainty of a test system comprising:

developing a test system model having a plurality of uncertainty terms;

entering the test system model into a simulator;

running a sufficient number of iterations of the test system model on the simulator while randomly varying each of a first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of results of a selected parameter; and

evaluating the results to determine a measurement uncertainty of the selected parameter.

2. The method of claim 1 wherein the simulator uses a harmonic balance simulation engine to produce the results.

3. The method of claim 1 wherein the simulator uses a time-domain simulation engine to produce the results.

4. The method of claim 1 wherein the simulator uses a linear S-parameter simulation engine to produce the results.

5. The method of claim 1 wherein the plurality of uncertainty terms includes a noise term.

6. The method of claim 1 wherein the plurality of uncertainty terms includes a test instrument uncertainty term for a test instrument in the test system.

7. The method of claim 6 wherein the test instrument uncertainty term is selected from the group consisting of a temperature drift uncertainty term, an aging drift uncertainty term, an accuracy uncertainty term, and a repeatability uncertainty term.

8. The method of claim 1 wherein the test system model includes a device under test and the step of running the sufficient number of iterations provides a first frequency to the device under test, and the results of the selected parameter are at a second frequency.

9. The method of claim 8 wherein the second frequency is a harmonic of the first frequency.

10. The method of claim 8 wherein the second frequency is a mixing product of the first frequency and a third frequency.

11. The method of claim 1 wherein the test system model includes a test instrument as a device under test.

12. The method of claim 1 wherein the test system model includes a test fixture comprising a plurality of switches and a plurality of cables.

13. The method of claim 1 wherein the step of running occurs at a first operating condition and further comprising steps of:

running a sufficient number of iterations of the test system model on the simulator at a second operating condition while randomly varying each of the first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of second results of the selected parameter; and

evaluating the second results to determine a second measurement uncertainty of the selected parameter.

14. The method of claim 1 wherein the step of running is done using a first type of simulation engine and further comprising steps of:

running a second sufficient number of iterations of the test system model on the simulator using a second type of simulation engine while randomly varying each of the first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of second results of a second selected parameter; and

evaluating the second results to determine a second measurement uncertainty of the second selected parameter.

15. The method of claim 1 further comprising a step of

developing a computer-readable library of test system components with uncertainty terms, and wherein the step of entering the test system model into the simulator includes loading uncertainty terms associated with the test system components from the computer-readable library.

16. The method of claim 1 wherein the step of developing the test system model includes automatically generating system specifications.

Evidence Appendix

none

Related Proceedings Appendix

none

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With respect to Claim 1, refer first to Figure 4 and the discussion thereof beginning on page 8 paragraph [0033] of the present application. The embodiment of the current invention shown in Figure 4 includes the steps of the method required by claim 1, beginning with a first step (402) of developing a model of the test system including a plurality of uncertainty terms. The next step (406) required by claim 1 enters the test system model into a simulator. Then, in step 408, a number of iterations are run on the simulator, varying some of the uncertainty terms, to obtain a statistically significant number of results for the measurement parameter of interest. The last step (410) of the method specified by claim 1 is that of evaluating the results of the simulation runs to determine a measurement uncertainty of the parameter of interest.

Claims 2-4 place limitations on the engine used by the simulator to produce the results. Claim 2 requires a harmonic balance simulation engine, claim 3 requires a time-domain simulation engine, and claim 4 requires a linear S-parameter simulation engine.

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Claim 16 specifies details of existing step 404 for developing the test system model.

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However, the Examiner does not explain how one would apply the system of Piratelli-Filho in the system of Jamneala. Applicant submits that there is no expectation of success in making such an application absent additional teachings.

Claim 1 requires a model with a plurality of **measurement uncertainties that are characterized by known probability distributions,** since the remainder of the claim requires that values for these uncertainties be chosen randomly with respect to such distributions. There is no such uncertainty in any of the models taught in Jamneala. Jamneala teaches a model in which the values of the inductances in a model of a probe are determined by varying the inductances in the model until the model generates results that agree with the results obtained with a known probe. There is no teaching of a probability distribution describing the statistical variability of the determined inductance. Without

knowing the uncertainty in the determined inductance, one cannot determine the uncertainty in the measurements made with the probe when applied to a device under test that arises from the uncertainty in the determined inductance.

The method of Piratelli-Filho also requires that **the uncertainty terms be described by known probability distributions**. Absent such distributions, there is no way to choose parameters for the Monte Carlo simulation technique taught in Piratelli-Filho. As noted above, the "uncertainty terms" that the Examiner identifies in Jamneala are not described by such probability distributions. They are simply the unknown values of the corrections for self inductance and mutual inductance to be applied to the model of the GSG probe to take into account a **fixed imperfection** in the probe. The method of Jamneala determines the values of the self inductance and mutual inductance and hence eliminates the errors arising from the imperfection in the probe.

Since the data needed to apply the teachings of Piratelli-Filho to the teaching of Jamneala is not present, Applicant submits that there is no expectation of success in making the combination of the two teachings.

In making the final rejection of this claim, the Examiner responds to Applicant's arguments by repeating that Jamneala teaches uncertainty terms and that Piratelli-Filho teaches a method for determining measurement uncertainties using simulation. The mere fact that all of the elements of a claim are known to the art is not sufficient to sustain a rejection under 35 U.S.C. 103. Identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. The mere fact that two or more references can be combined does not make the combination obvious unless the art also contains something to suggest the desirability of the combination (*In re Imperato*, 179 USPQ 730, 732; Interconnect Planning Corp. v. Feil, 227 USPQ 543, 551).

Accordingly, Applicant submits that the Examiner has failed to make a *prima facie* case for obviousness with respect to Claim 1 and the Claims dependent therefrom.

2. Rejection of Claims 2-4

Claims 2, 3, and 4 specify one type of engine each, as being used by the simulator to produce the results. The Examiner points to one passage in Jamneala (col. 6, lines 7-17) and one in Piratelli-Filho (section 2.2-3) for all of these additional teachings. Applicant submits that the cited passage in Jamneala merely refers to the use of an ADS simulator for generating a simulated model of a probe of the type taught in Jamneala being used with an exemplary circuit shown in Figure 2A of Jamneala, while the cited passage in Piratelli-Filho is a discussion of Monte Carlo simulation that does not mention any of the three types of engine of interest.

Applicant submits that while an ADS includes a harmonic balance simulation engine, and may also include time-domain or linear S-parameter simulation engines, the issue is not whether an ADS simulator includes harmonic balance, time-domain or linear S-parameter simulation engines, but whether Jamneala (or Piratelli-Filho) teaches the use of each of those engines in carrying out the method. Applicant submits that the Examiner has not pointed to any such teaching in Jamneala (or Piratelli-Filho) that any one of the three types of simulation engine is utilized in the simulations.

It should also be noted that Piratelli-Filho is directed to a method for determining measurement uncertainties in a mechanical system, and hence, any electronic simulation engine would be of limited, if any, relevance.

In making the final rejection, the Examiner responds to Applicant's arguments by encouraging Applicant to "further review the references cited not used for further information on the ADS simulator". Applicant must repeat that the issue is not the capability of the ADS simulator but whether the three specific simulation methods specified by claims 2, 3, and 4, are either taught by the prior art or obvious in view of the prior art. The Examiner has not pointed to any support for either of these alternatives.

Hence, Applicant submits that there are additional grounds for allowing Claims 2, 3, and 4.

3. Rejection of Claim 8

Claim 8 concerns the frequency at which either the DUT is probed and/or the results of the probing are analyzed. In particular, Claim 8 requires that the DUT is probed at a first frequency but the results are measured at a second frequency. The Examiner points to a series of passages in Jamneala and Piratelli-Filho (Jamneala Fig. 1B-4, col. 1, lines 60-64 and col. 6, line 41 to col. 8, lines 23; also Piratelli-Filho pg. 1-4) for the relevant teachings. Applicant submits that the cited figures and passages in Jamneala at best show that measurement simulations may be made over a range of frequencies. The Examiner has not pointed to any specific teachings in either of the cited prior art references that disclose probing the DUT at a first frequency and measuring the results at a second frequency. Moreover, as noted above, Piratelli-Filho is directed to mechanical systems in which electrical measurements at specific frequencies would have little if any relevance. Hence, Applicant submits that there are additional grounds for allowing Claim 8 and the Claims dependent therefrom.

4. Rejection of Claim 9

Claim 9 depends from Claim 8 and requires that the second frequency is a harmonic of the first frequency. The Examiner has not pointed to any such teaching in the cited art. Hence, there are additional grounds for allowing Claim 9.

5. Rejection of Claim 10

Claim 10 depends from Claim 8 and requires that the second frequency is a mixed product of the first frequency and a third frequency. Once again, the Examiner has not pointed to any such teaching in the cited art. Accordingly, there are additional grounds for allowing Claim 10.

6. Rejection of Claim 12

Claim 12 requires that the test system model includes a test fixture comprising a plurality of switches and a plurality of cables. The Examiner points to Jamneala, Fig. 1, col. 1, lines 60-64, col. 3, line 50 to col. 4, line 6; Piratelli-Filho pg. 1- 4 for the additional teaching. Applicant submits that there is no teaching in the cited Figures and passages in Jamneala of any switches or cables being included in the test system model. Applicant submits that the

Examiner has not pointed to any specific teachings within the 4 pages of the Piratelli-Filho reference regarding this limitation. In fact, the teachings of Piratelli-Filho are directed to measurements of a mechanical system that lacks both switches and cables.

In making the final rejection, the Examiner points to Jamneala (col.3 line 29-col.4 line 48) as teaching the plurality of switches and cables. First, Applicant submits that there is no mention of switches in the cited passages. Second, Applicant submits that the only mention of cables concerns the use of test cables in conventional calibration schemes (col.3 lines 35-37) and that Jamneala does not teach that even one cable is included in the test system model.

Hence, Applicant submits that there are additional grounds for allowing Claim 12.

7. Rejection of Claim 13

Claim 13 requires that the step of running occurs at a first operating condition and that the method also includes running a sufficient number of iterations of the test system model on the simulator at a second operating condition while randomly varying each of the first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of second results of the selected parameter, and evaluating the second results to determine a second measurement uncertainty of the selected parameter.

In rejecting claims 13 and 14, the Examiner points to Jamneala (Fig. 2B-5, col. 6, line 41 - col. 8, lines 23) and Piratelli-Filho (pg. 1- 4) as providing the additional teachings regarding the simulation steps. Applicant submits that **there are no uncertainty terms** in the system taught by Jamneala, that **no terms are randomly varied** in the system taught by Jamneala, and that **no measurement uncertainties are determined by evaluation of a set of "second results"**. With respect to the Examiner's citation of Piratelli-Filho, Applicant submits that it is the burden of the Examiner to point to specific teachings rather than to all four pages of the paper. The Examiner has not pointed to any specific passages within Piratelli-Filho that provide the missing teaching. Furthermore, Applicant can find no such teaching in the reference.

Moreover, regarding a further requirement of claim 13, Applicant submits that Jamneala does a single set of simulations at one set of conditions to determine the uncertainties taught therein. There is no need to run the simulations at a second operating condition, since the uncertainty to which Jamneala is directed can be removed with a simulation at one operating condition. Hence, there are additional grounds for allowing Claims 13.

8. Rejection of Claim 14

Claim 14 requires that the step of running includes running the simulation on a first simulation engine and then running the simulation on a second simulation engine. The Examiner has not pointed to any teachings in the reference of such a method. Hence, there are additional grounds for allowing Claim 14.

9. Rejection of Claim 15

Regarding Claim 15, the Examiner points to col. 8, lines 35-45 of Jamneala as teaching the additional requirement of a step of developing a computer-readable library of test system components with uncertainty terms, and wherein the step of entering the test system model into the simulator includes loading uncertainty terms associated with the test system components from the computer-readable library. Applicant submits that there is no teaching in the cited passage regarding the existence, let alone the loading of any uncertainty terms associated with the GSG probe. Hence, Applicant submits that there are additional grounds for allowing Claim 15.

10. Rejection of Claim 16

With respect to Claim 16, the Examiner points to Jamneala Fig. 5, col. 8, lines 12-23; Piratelli-Filho pg. 1- 4 as providing the additional teaching of the step of developing the test system model including automatically generating system specifications. Applicant submits that the cited figure and passage in Jamneala refer to the comparison of measurements and simulations but **do not disclose the automatic generation of system specifications**. With respect to the Examiner's citation of Piratelli-Filho, Applicant submits that it is the burden of

the Examiner to point to specific teachings rather than to all four pages of the paper. The Examiner has not pointed to any specific passages within Piratelli-Filho that provide the missing teaching.

In making the final rejection, the Examiner cites another passage in Jamneala (col.6 line 41-col.7 line 38) as providing the missing teachings. Applicant submits that this passage discusses simulated transmission and reflection characteristics but is silent as to any automatic generation of system specifications.

Hence, Applicant submits that there are additional grounds for allowing Claim 16.

C. Rejection of Claim 5 as being unpatentable over Jamneala in view of Piratelli-Filho and further in view of Helisto.

In making this rejection, the Examiner admits that Jamneala in view of Piratelli-Filho does not teach that the plurality of uncertainty terms includes a noise term, as required by Claim 5. The Examiner looks to Helisto for the missing teachings. The Examiner maintains that it would have been obvious to combine the uncertainty measurement method of Helisto with the method of Jamneala and the uncertainty evaluation method of Piratelli-Filho "because Helisto teaches a development that enables the measurements down to the fundamental noise limit of metrological devices (pg 402)."

First, as noted above with respect to Claim 1, from which Claim 5 depends, Applicant submits that Jamneala in view of Piratelli-Filho does not teach the limitations of the base claim, and there is no reasonable expectation of success in applying the method taught in Piratelli-Filho to the teachings of Jamneala. Helisto does not provide the missing motivation or teachings.

Second, Applicant submits that the motivation proposed by the Examiner for modifying the method taught by Jamneala according to the teachings of Helisto to satisfy the additional limitations of Claim 5 is flawed in two respects.

First, Applicant disagrees with the Examiner's reading of Helisto as teaching a development that enables measurements down to the fundamental noise limit of metrological devices. Applicant submits that while Helisto states (page 102, first line of Conclusions) that "present day instrumentation" enables such measurements, Helisto is silent as to how that is achieved, and is concerned instead with characterizing what that noise limit is in various frequency ranges. Hence, Applicant submits that applying the teachings of Helisto to Jamneala would not provide the benefit suggested by the Examiner of enabling measurements down to the fundamental noise limit.

Second, as noted above with respect to Claim 1, Applicant submits that there are no measurement uncertainties in the system of interest to Jamneala. There would be a measurement error due to a fixed imperfection, but that error is avoided by using the iterative simulation taught by Jamneala to converge on best-fit values of self inductance and mutual inductance to put into the model. Helisto is simply concerned with the study and characterization of 1/f noise. The Examiner has not pointed to any suggestion that there is any source of 1/f noise in the test system of interest to Jamneala. Hence, Applicant submits that there would be no motivation to use any of the teachings of Helisto regarding 1/f noise in the system taught by Jamneala.

In making the final rejection, the Examiner responds to Applicant's arguments by stating that Helisto measures "noise uncertainty in a noise region of a Zener voltage at high frequency". The Examiner has not pointed to any teaching in Jamneala regarding a Zener voltage. Hence, Applicant maintains that applying Helisto to the system of Jamneala would not be obvious.

Accordingly, Applicant submits that the Examiner has failed to make a *prima facie* case for obviousness with respect to Claim 5.

VIII. CONCLUSION

Appellants respectfully submit that for the reasons of fact and law argued herein, the decision of the Examiner in finally rejecting Claims 1-16 should be reversed.

Respectfully Submitted,

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Date: November 6, 2007

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APPENDIX

THE CLAIMS ON APPEAL:

1. A method of determining a measurement uncertainty of a test system comprising:

developing a test system model having a plurality of uncertainty terms;

entering the test system model into a simulator;

running a sufficient number of iterations of the test system model on the simulator while randomly varying each of a first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of results of a selected parameter; and

evaluating the results to determine a measurement uncertainty of the selected parameter.

2. The method of claim 1 wherein the simulator uses a harmonic balance simulation engine to produce the results.

3. The method of claim 1 wherein the simulator uses a time-domain simulation engine to produce the results.

4. The method of claim 1 wherein the simulator uses a linear S-parameter simulation engine to produce the results.

5. The method of claim 1 wherein the plurality of uncertainty terms includes a noise term.

6. The method of claim 1 wherein the plurality of uncertainty terms includes a test instrument uncertainty term for a test instrument in the test system.

7. The method of claim 6 wherein the test instrument uncertainty term is selected from the group consisting of a temperature drift uncertainty term, an aging drift uncertainty term, an accuracy uncertainty term, and a repeatability uncertainty term.

8. The method of claim 1 wherein the test system model includes a device under test and the step of running the sufficient number of iterations provides a first frequency to the device under test, and the results of the selected parameter are at a second frequency.

9. The method of claim 8 wherein the second frequency is a harmonic of the first frequency.

10. The method of claim 8 wherein the second frequency is a mixing product of the first frequency and a third frequency.

11. The method of claim 1 wherein the test system model includes a test instrument as a device under test.

12. The method of claim 1 wherein the test system model includes a test fixture comprising a plurality of switches and a plurality of cables.

13. The method of claim 1 wherein the step of running occurs at a first operating condition and further comprising steps of:

running a sufficient number of iterations of the test system model on the simulator at a second operating condition while randomly varying each of the first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of second results of the selected parameter; and

evaluating the second results to determine a second measurement uncertainty of the selected parameter.

14. The method of claim 1 wherein the step of running is done using a first type of simulation engine and further comprising steps of:

running a second sufficient number of iterations of the test system model on the simulator using a second type of simulation engine while randomly varying each of the first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of second results of a second selected parameter; and

evaluating the second results to determine a second measurement uncertainty of the second selected parameter.

15. The method of claim 1 further comprising a step of

developing a computer-readable library of test system components with uncertainty terms, and wherein the step of entering the test system model into the simulator includes loading uncertainty terms associated with the test system components from the computer-readable library.

16. The method of claim 1 wherein the step of developing the test system model includes automatically generating system specifications.

Evidence Appendix

none

Related Proceedings Appendix

none

PATENT APPLICATION
Attorney Docket: 10030906-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS

Applicant:	Pleasant
Serial No.:	10/783,645
Filed:	2/20/2004
For:	Method of Determining Measurement Uncertainties Using Circuit Simulation
Group Art Unit:	2123
Examiner:	Pierre Louis, Andre

BRIEF FOR APPELLANT

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an appeal from the decision of the Primary Examiner dated 09/11/2007, finally rejecting Claims 1-16 in the above-identified patent application.

I. REAL PARTY IN INTEREST

The real party in interest is Agilent Technologies having an address as listed below.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to appellant, the appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in this pending appeal.

III. STATUS OF THE CLAIMS

Claims 1-16 are currently pending in the above-identified patent application. In the Office Action dated 09/11/2007, the Examiner rejected Claims 1-16 and indicated that the Action was final. Claims 1-16 are the subject of this appeal.

IV. STATUS OF AMENDMENTS

No Amendments have been filed after the above identified Final action.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention is directed to a method for determining a measurement uncertainty of a test system, using a test model having a plurality of uncertainty terms entered into a simulator. The test system model is run on the simulator with some of the uncertainty terms randomly varied within probability distributions to produce a statistically significant number of results of the parameter whose uncertainty is to be evaluated.

With respect to Claim 1, refer first to Figure 4 and the discussion thereof beginning on page 8 paragraph [0033] of the present application. The embodiment of the current invention shown in Figure 4 includes the steps of the method required by claim 1, beginning with a first step (402) of developing a model of the test system including a plurality of uncertainty terms. The next step (406) required by claim 1 enters the test system model into a simulator. Then, in step 408, a number of iterations are run on the simulator, varying some of the uncertainty terms, to obtain a statistically significant number of results for the measurement parameter of interest. The last step (410) of the method specified by claim 1 is that of evaluating the results of the simulation runs to determine a measurement uncertainty of the parameter of interest.

Claims 2-4 place limitations on the engine used by the simulator to produce the results. Claim 2 requires a harmonic balance simulation engine, claim 3 requires a time-domain simulation engine, and claim 4 requires a linear S-parameter simulation engine.

Claims 5 and 6 relate to the plurality of uncertainty terms used to develop the model of the test system, with claim 5 requiring that the plurality of uncertainty terms includes a noise term, and claim 6 requiring that the plurality of uncertainty terms includes a test instrument uncertainty term for a test instrument in the test system. Claim 7 limits the uncertainty term to being either a temperature drift uncertainty term, an aging drift uncertainty term, an accuracy uncertainty term, or a repeatability uncertainty term.

Claims 8-12 relate to the test system model, with claim 8 requiring the test system model to include a device under test and also, along with claims 9 and 10, putting limitations on the step of running the iterations of the simulation regarding signal frequencies. Claim 11 requires the test system model to include a test instrument as a device under test, and claim 12 requires the inclusion of a test fixture comprising a plurality of switches and a plurality of cables.

Claims 13 and 14 specify details for the step 408 that runs iterations of the simulation.

Claim 15 adds a step of developing a computer-readable library to the method of claim 1, which affects the existing step 406 for entering the model into the simulator.

Claim 16 specifies details of existing step 404 for developing the test system model.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. **Rejection of Claims 1-4 and 6-16 under U.S.C. 103(a) as being unpatentable over Jamneala (US 6,804,807) in view of Piratelli-Filho (Uncertainty Evaluation in Small angle calibration Using ISO GUM Approach and Monte Carlo Method, June 2003).**

B. **Rejection of Claim 5 under U.S.C. 103(a) as being unpatentable over Jamneala, in view of Piratelli-Filho and further in view of Helisto (Measurement Uncertainty in the 1/f noise region: Zener Voltage Standards IEEE 2000).**

VII. ARGUMENT

A. Examiner's Burden under 35 U.S.C. 103

To sustain a rejection under 35 U.S.C. 103, the Examiner must show that the combined references teach each of the elements of the claim or that there is some motivation in the art for altering one of the teachings to arrive at the combined set of teachings. "The mere fact that a reference could be modified to produce the patented invention would not make the modification obvious unless it is suggested by the prior art." (*Libbey-Owens-Ford v. BOC Group*, 4 USPQ 2d 1097, 1103). In addition, the Examiner must show that there is

some motivation in the art that would cause someone of ordinary skill to combine the references, and that in making the combination, there was a reasonable expectation of success. Where the claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under section 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *In re Vaeck*, 20 USPQ2d 1438, 1442(CAFC 1991).

B. Rejection of Claims 1-4 and 6-16 as being unpatentable over Jamneala in view of Piratelli-Filho

1. Rejection of Claim 1 and the claims dependent therefrom

In rejecting claim 1, the Examiner states that Jamneala teaches the limitations except for any explicit mention of measurement uncertainty. The Examiner looks to Piratelli-Filho for the missing terminology/teaching, maintaining that it would be obvious to apply the latter teachings to obtain "expanded uncertainly results ....to simplify analysis (abstract)" in the system of Jamneala.

However, the Examiner does not explain how one would apply the system of Piratelli-Filho in the system of Jamneala. Applicant submits that there is no expectation of success in making such an application absent additional teachings.

Claim 1 requires a model with a plurality of **measurement uncertainties that are characterized by known probability distributions,** since the remainder of the claim requires that values for these uncertainties be chosen randomly with respect to such distributions. There is no such uncertainty in any of the models taught in Jamneala. Jamneala teaches a model in which the values of the inductances in a model of a probe are determined by varying the inductances in the model until the model generates results that agree with the results obtained with a known probe. There is no teaching of a probability distribution describing the statistical variability of the determined inductance. Without

knowing the uncertainty in the determined inductance, one cannot determine the uncertainty in the measurements made with the probe when applied to a device under test that arises from the uncertainty in the determined inductance.

The method of Piratelli-Filho also requires that **the uncertainty terms be described by known probability distributions**. Absent such distributions, there is no way to choose parameters for the Monte Carlo simulation technique taught in Piratelli-Filho. As noted above, the "uncertainty terms" that the Examiner identifies in Jamneala are not described by such probability distributions. They are simply the unknown values of the corrections for self inductance and mutual inductance to be applied to the model of the GSG probe to take into account a **fixed imperfection** in the probe. The method of Jamneala determines the values of the self inductance and mutual inductance and hence eliminates the errors arising from the imperfection in the probe.

Since the data needed to apply the teachings of Piratelli-Filho to the teaching of Jamneala is not present, Applicant submits that there is no expectation of success in making the combination of the two teachings.

In making the final rejection of this claim, the Examiner responds to Applicant's arguments by repeating that Jamneala teaches uncertainty terms and that Piratelli-Filho teaches a method for determining measurement uncertainties using simulation. The mere fact that all of the elements of a claim are known to the art is not sufficient to sustain a rejection under 35 U.S.C. 103. Identification in the prior art of each individual part claimed is insufficient to defeat patentability of the whole claimed invention. The mere fact that two or more references can be combined does not make the combination obvious unless the art also contains something to suggest the desirability of the combination (*In re Imperato*, 179 USPQ 730, 732; Interconnect Planning Corp. v. Feil, 227 USPQ 543, 551).

Accordingly, Applicant submits that the Examiner has failed to make a *prima facie* case for obviousness with respect to Claim 1 and the Claims dependent therefrom.

2. Rejection of Claims 2-4

Claims 2, 3, and 4 specify one type of engine each, as being used by the simulator to produce the results. The Examiner points to one passage in Jamneala (col. 6, lines 7-17) and one in Piratelli-Filho (section 2.2-3) for all of these additional teachings. Applicant submits that the cited passage in Jamneala merely refers to the use of an ADS simulator for generating a simulated model of a probe of the type taught in Jamneala being used with an exemplary circuit shown in Figure 2A of Jamneala, while the cited passage in Piratelli-Filho is a discussion of Monte Carlo simulation that does not mention any of the three types of engine of interest.

Applicant submits that while an ADS includes a harmonic balance simulation engine, and may also include time-domain or linear S-parameter simulation engines, the issue is not whether an ADS simulator includes harmonic balance, time-domain or linear S-parameter simulation engines, but whether Jamneala (or Piratelli-Filho) teaches the use of each of those engines in carrying out the method. Applicant submits that the Examiner has not pointed to any such teaching in Jamneala (or Piratelli-Filho) that any one of the three types of simulation engine is utilized in the simulations.

It should also be noted that Piratelli-Filho is directed to a method for determining measurement uncertainties in a mechanical system, and hence, any electronic simulation engine would be of limited, if any, relevance.

In making the final rejection, the Examiner responds to Applicant's arguments by encouraging Applicant to "further review the references cited not used for further information on the ADS simulator". Applicant must repeat that the issue is not the capability of the ADS simulator but whether the three specific simulation methods specified by claims 2, 3, and 4, are either taught by the prior art or obvious in view of the prior art. The Examiner has not pointed to any support for either of these alternatives.

Hence, Applicant submits that there are additional grounds for allowing Claims 2, 3, and 4.

3. Rejection of Claim 8

Claim 8 concerns the frequency at which either the DUT is probed and/or the results of the probing are analyzed. In particular, Claim 8 requires that the DUT is probed at a first frequency but the results are measured at a second frequency. The Examiner points to a series of passages in Jamneala and Piratelli-Filho (Jamneala Fig. 1B-4, col. 1, lines 60-64 and col. 6, line 41 to col. 8, lines 23; also Piratelli-Filho pg. 1-4) for the relevant teachings. Applicant submits that the cited figures and passages in Jamneala at best show that measurement simulations may be made over a range of frequencies. The Examiner has not pointed to any specific teachings in either of the cited prior art references that disclose probing the DUT at a first frequency and measuring the results at a second frequency. Moreover, as noted above, Piratelli-Filho is directed to mechanical systems in which electrical measurements at specific frequencies would have little if any relevance. Hence, Applicant submits that there are additional grounds for allowing Claim 8 and the Claims dependent therefrom.

4. Rejection of Claim 9

Claim 9 depends from Claim 8 and requires that the second frequency is a harmonic of the first frequency. The Examiner has not pointed to any such teaching in the cited art. Hence, there are additional grounds for allowing Claim 9.

5. Rejection of Claim 10

Claim 10 depends from Claim 8 and requires that the second frequency is a mixed product of the first frequency and a third frequency. Once again, the Examiner has not pointed to any such teaching in the cited art. Accordingly, there are additional grounds for allowing Claim 10.

6. Rejection of Claim 12

Claim 12 requires that the test system model includes a test fixture comprising a plurality of switches and a plurality of cables. The Examiner points to Jamneala, Fig. 1, col. 1, lines 60-64, col. 3, line 50 to col. 4, line 6; Piratelli-Filho pg. 1- 4 for the additional teaching. Applicant submits that there is no teaching in the cited Figures and passages in Jamneala of any switches or cables being included in the test system model. Applicant submits that the

Examiner has not pointed to any specific teachings within the 4 pages of the Piratelli-Filho reference regarding this limitation. In fact, the teachings of Piratelli-Filho are directed to measurements of a mechanical system that lacks both switches and cables.

In making the final rejection, the Examiner points to Jamneala (col.3 line 29-col.4 line 48) as teaching the plurality of switches and cables. First, Applicant submits that there is no mention of switches in the cited passages. Second, Applicant submits that the only mention of cables concerns the use of test cables in conventional calibration schemes (col.3 lines 35-37) and that Jamneala does not teach that even one cable is included in the test system model.

Hence, Applicant submits that there are additional grounds for allowing Claim 12.

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Moreover, regarding a further requirement of claim 13, Applicant submits that Jamneala does a single set of simulations at one set of conditions to determine the uncertainties taught therein. There is no need to run the simulations at a second operating condition, since the uncertainty to which Jamneala is directed can be removed with a simulation at one operating condition. Hence, there are additional grounds for allowing Claims 13.

8. Rejection of Claim 14

Claim 14 requires that the step of running includes running the simulation on a first simulation engine and then running the simulation on a second simulation engine. The Examiner has not pointed to any teachings in the reference of such a method. Hence, there are additional grounds for allowing Claim 14.

9. Rejection of Claim 15

Regarding Claim 15, the Examiner points to col. 8, lines 35-45 of Jamneala as teaching the additional requirement of a step of developing a computer-readable library of test system components with uncertainty terms, and wherein the step of entering the test system model into the simulator includes loading uncertainty terms associated with the test system components from the computer-readable library. Applicant submits that there is no teaching in the cited passage regarding the existence, let alone the loading of any uncertainty terms associated with the GSG probe. Hence, Applicant submits that there are additional grounds for allowing Claim 15.

10. Rejection of Claim 16

With respect to Claim 16, the Examiner points to Jamneala Fig. 5, col. 8, lines 12-23; Piratelli-Filho pg. 1- 4 as providing the additional teaching of the step of developing the test system model including automatically generating system specifications. Applicant submits that the cited figure and passage in Jamneala refer to the comparison of measurements and simulations but **do not disclose the automatic generation of system specifications**. With respect to the Examiner's citation of Piratelli-Filho, Applicant submits that it is the burden of

the Examiner to point to specific teachings rather than to all four pages of the paper. The Examiner has not pointed to any specific passages within Piratelli-Filho that provide the missing teaching.

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Hence, Applicant submits that there are additional grounds for allowing Claim 16.

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First, as noted above with respect to Claim 1, from which Claim 5 depends, Applicant submits that Jamneala in view of Piratelli-Filho does not teach the limitations of the base claim, and there is no reasonable expectation of success in applying the method taught in Piratelli-Filho to the teachings of Jamneala. Helisto does not provide the missing motivation or teachings.

Second, Applicant submits that the motivation proposed by the Examiner for modifying the method taught by Jamneala according to the teachings of Helisto to satisfy the additional limitations of Claim 5 is flawed in two respects.

First, Applicant disagrees with the Examiner's reading of Helisto as teaching a development that enables measurements down to the fundamental noise limit of metrological devices. Applicant submits that while Helisto states (page 102, first line of Conclusions) that "present day instrumentation" enables such measurements, Helisto is silent as to how that is achieved, and is concerned instead with characterizing what that noise limit is in various frequency ranges. Hence, Applicant submits that applying the teachings of Helisto to Jamneala would not provide the benefit suggested by the Examiner of enabling measurements down to the fundamental noise limit.

Second, as noted above with respect to Claim 1, Applicant submits that there are no measurement uncertainties in the system of interest to Jamneala. There would be a measurement error due to a fixed imperfection, but that error is avoided by using the iterative simulation taught by Jamneala to converge on best-fit values of self inductance and mutual inductance to put into the model. Helisto is simply concerned with the study and characterization of 1/f noise. The Examiner has not pointed to any suggestion that there is any source of 1/f noise in the test system of interest to Jamneala. Hence, Applicant submits that there would be no motivation to use any of the teachings of Helisto regarding 1/f noise in the system taught by Jamneala.

In making the final rejection, the Examiner responds to Applicant's arguments by stating that Helisto measures "noise uncertainty in a noise region of a Zener voltage at high frequency". The Examiner has not pointed to any teaching in Jamneala regarding a Zener voltage. Hence, Applicant maintains that applying Helisto to the system of Jamneala would not be obvious.

Accordingly, Applicant submits that the Examiner has failed to make a *prima facie* case for obviousness with respect to Claim 5.

VIII. CONCLUSION

Appellants respectfully submit that for the reasons of fact and law argued herein, the decision of the Examiner in finally rejecting Claims 1-16 should be reversed.

Respectfully Submitted,

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APPENDIX

THE CLAIMS ON APPEAL:

1. A method of determining a measurement uncertainty of a test system comprising:

developing a test system model having a plurality of uncertainty terms;

entering the test system model into a simulator;

running a sufficient number of iterations of the test system model on the simulator while randomly varying each of a first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of results of a selected parameter; and

evaluating the results to determine a measurement uncertainty of the selected parameter.

2. The method of claim 1 wherein the simulator uses a harmonic balance simulation engine to produce the results.

3. The method of claim 1 wherein the simulator uses a time-domain simulation engine to produce the results.

4. The method of claim 1 wherein the simulator uses a linear S-parameter simulation engine to produce the results.

5. The method of claim 1 wherein the plurality of uncertainty terms includes a noise term.

6. The method of claim 1 wherein the plurality of uncertainty terms includes a test instrument uncertainty term for a test instrument in the test system.

7. The method of claim 6 wherein the test instrument uncertainty term is selected from the group consisting of a temperature drift uncertainty term, an aging drift uncertainty term, an accuracy uncertainty term, and a repeatability uncertainty term.

8. The method of claim 1 wherein the test system model includes a device under test and the step of running the sufficient number of iterations provides a first frequency to the device under test, and the results of the selected parameter are at a second frequency.

9. The method of claim 8 wherein the second frequency is a harmonic of the first frequency.

10. The method of claim 8 wherein the second frequency is a mixing product of the first frequency and a third frequency.

11. The method of claim 1 wherein the test system model includes a test instrument as a device under test.

12. The method of claim 1 wherein the test system model includes a test fixture comprising a plurality of switches and a plurality of cables.

13. The method of claim 1 wherein the step of running occurs at a first operating condition and further comprising steps of:

running a sufficient number of iterations of the test system model on the simulator at a second operating condition while randomly varying each of the first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of second results of the selected parameter; and

evaluating the second results to determine a second measurement uncertainty of the selected parameter.

14. The method of claim 1 wherein the step of running is done using a first type of simulation engine and further comprising steps of:

running a second sufficient number of iterations of the test system model on the simulator using a second type of simulation engine while randomly varying each of the first portion of the plurality of uncertainty terms within probability distributions to produce a statistically significant number of second results of a second selected parameter; and

evaluating the second results to determine a second measurement uncertainty of the second selected parameter.

15. The method of claim 1 further comprising a step of

developing a computer-readable library of test system components with uncertainty terms, and wherein the step of entering the test system model into the simulator includes loading uncertainty terms associated with the test system components from the computer-readable library.

16. The method of claim 1 wherein the step of developing the test system model includes automatically generating system specifications.

Evidence Appendix

none

Related Proceedings Appendix

none